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PATENT SPECIFICATION (11) 1 371 254

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(21) Application No. 52479/72 (22) Filed 14 Nov. 1972 (19)
(31) Convention Application No. 213 201 (32) Filed 28 Dec. 1971 in
(33) United States of America (US)
(46) Complete Specification published 23 Oct. 1974
(51) International Classification B32B 7/02 B42D 15/02
B32B 27/08 27/20



- (52) Index at acceptance
BSN 0314 0324 0702 2708 2730
B6A 42A 42D

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(54) CODED CARD

- (71) We, INTERNATIONAL BUSINESS
MACHINES CORPORATION, a Corporation
organized and existing under the laws of
the State of New York in the United States
of America, of Armonk, New York 10504,
United States of America, do hereby declare
the invention, for which we pray that a
patent may be granted to us, and the method
by which it is to be performed, to be par-
ticularly described in and by the following
statement:—
- The invention relates to a coded card.
According to the invention there is pro-
vided a coded card exhibiting a substantially
uniform transmissivity and surface reflectance
in the visible light region comprising
a first film and a second film laminated upon
the first film, said films having different
optical absorption characteristics at a sub-
stantially single frequency lying within an
optical bandpass in the non-visible region
and said card being encoded by either select-
ively aperturing the second film prior to
lamination or laminating discrete portions
of the second film upon selected areas of
the first film.
- It is well-known that the visible spectrum,
as seen by the average human eye, extends
from violet (wavelength of 0.38 microns) to
red (0.78 microns). The eye is most sensi-
tive to yellow-green (0.55 microns) which
lies well within the violet-red range. Now,
the infra red region especially in the 1.0
micron to 15 micron region is blessed with
detectors such as gallium arsenide. Accord-
ingly, the described embodiment contem-
plates a card transparent to light in the
visible region and in at least one non-visible
region such as infra red.
- One flexible, tough thermoplastic having
this spectral requirement is polyvinyl
chloride (PVC) suitably permeable in the
visible and infra red regions. The PVC
bandpass transmission characteristic is sub-
stantially flat and non-absorbent from about
3.5 microns to about 7.0 microns. It was
also observed that a carbonyl group attached
to such a polymeric film structure would ex-
hibit a near single frequency absorption
characteristic well within the 3.5—7.0 micron
range at 5.8 microns.
- In the preferred embodiment, the card
is formed from a film of PVC laminated onto
a film of copolymer of vinyl chloride and
vinylacetate (PVAC). The PVAC layer can
be exceedingly thin. The indicia can be
encoded onto the card by selectively aper-
turing the PVAC layer by punching holes
before lamination. Upon lamination, the
PVC is caused to fill the apertures. This
renders the apertures optically indistinguish-
able in visible light. Alternatively the en-
coding can be accomplished by the deposi-
tion of PVAC strips onto discrete preselected
areas of the PVC film by a rapid evapora-
tion process.
- It should be recalled that PVAC has sub-
stantially similar optical and physico-
chemical characteristics as PVC but for its
discrete substantially single frequency ab-
sorption characteristic. This means that
light illuminating the laminate in the visible
region will be either passed through the
structure or partially reflected from the sur-
faces uniformly. When the laminate is
illuminated by light in the infra red region,
a spectral difference is detectable only at
substantially 5.8 microns.
- Since PVC and PVAC are commercially
available in sheet form lamination can be
effectuated by placing respective sheets one
upon the other between hot platens or
calenders. Because the dwell time between
the calender rolls is short i.e. about a second
or less, a temperature above the melting tem-
perature of approximately 250°C can be
used. Note that in the form of lamination,
there is only a small amount of plastic flow.
As previously mentioned, the best form
contemplates that only the second film con-

tain the carbonyl groups. It is recalled from Beer's law that the amount of light absorbed is proportional to the concentration of the absorbing material. Consequently, if both

5 films are of the same material and the second film has a significantly higher concentration of carbonyl groups than the first film, then there would still be a detectable spectral difference. This factor becomes of some
10 significance in the practice of the invention in view of the commercial difficulty of obtaining carbonyl group free PVC. Illustratively, films frequently contain plasticizers, e.g., dioctyl phthalate or (di-2-ethyl
15 hexyl phthalate), to maintain a degree of suppleness. This plasticizer contains as many as 2 carbonyl groups per mole. Likewise, polyaromatic stabilizers may be added to prevent polymer degradation. These also contain carbonyl groups.

In circumstances where it is desired to protect the coded indicia from alteration due to wear or accidental scratching, a PVC layer can be laminated on top of the second film forming a sandwich therefrom.
25 Vacuum lamination, for example, avoids any trapping of gas bubbles.

Another example of a laminate according to the invention exhibiting a "notch frequency" in the infra red region is a card
30 formed from polydicyclopentadiene and polyethylene.

Note that the mechanical strength of the bond may vary as a function of the differences, if any, in the melting temperatures and whether the melting point is sharply defined. In the above cases, plastics having amorphous structures are used. In this situation, a range of melt temperatures can be expected.

The first film may be formed of vinyl cyclohexane copolymer, vinylidene chloride copolymer, polybutylene glycol monocarbonate, polypropylene oxide or polyisoprene, and the second film may be formed of vinyl chloride methacrylate copolymer,
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polyvinyl formal, polyvinyl propionate or polyvinyl pyrrolidone.

WHAT WE CLAIM IS:—

1. A coded card exhibiting a substantially uniform transmissivity and surface reflectance in the visible light region comprising a first film and a second film laminated upon the first film, said films having different optical absorption characteristics at different optical single frequency lying within an optical bandpass in the non-visible region and said card being encoded by either selectively aperturing the second film prior to lamination or laminating discrete portions of the second film upon selected areas of the first film.

2. A card according to Claim 1, in which the first film has an optical bandpass transmission characteristic in the infra red region.

3. A card according to Claim 1 or 2, in which said films are formed from the same material and the second film includes a carbonyl group.

4. A card according to Claim 1 or 2, in which said films are formed from different materials and the second film includes a carbonyl group.

5. A card according to any one of Claims 1, 2 or 4, in which the first film is formed from polyvinyl chloride, vinyl cyclohexane copolymer, vinylidene chloride copolymer, polyethylene glycol monocarbonate, polypropylene oxide, or polyisoprene and the second film is formed from a copolymer of vinyl chloride and vinyl acetate, vinyl chloride/methacrylate copolymer, polyvinyl formal, polyvinyl propionate or polyvinyl pyrrolidone.

6. A coded identity card substantially as hereinbefore described.

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Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon), Ltd.—1974.
Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AT,
from which copies may be obtained.



Bescheid/Protokoll (Anlage)

Datum
Date 26.06.2003
Date

Communication/Mémoires (Annex)

Blatt
Sheet 1
Feuille

Notification/Procès-verbal (Annexe)

Anmelde-Nr.:
Application No.: 00 961 558,4
Demande n°:

The examination is being carried out on the following application documents:

Text for the Contracting States:

AT BE CH LI CY DE DK ES FI FR GB GR IE IT LU MC NL PT

Description, pages:

1,2,4,5,7-27 as published

6,6a as received on 21.11.2001 with letter of 21.11.2001

3 as received on 10.05.2003 with letter of 06.05.2003

Claims, No.:

1-21 as received on 10.05.2003 with letter of 06.05.2003

Drawings, sheets:

1/30-30/30 as published

1. The following document (D) is referred to in this communication; the numbering will be adhered to in the rest of the procedure:

D10* = GB-A-1371254

*A copy of D10 is annexed to this communication.

2. As to claim 1 reference is made in D10 e.g. to L71-78.

Thus, the subject-matter of claim 1 is not novel.